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ABSTRACT

Two groups of educable retardates (16 gainers and 16 nongainers who were judged to have a more consistent history of failure) were identified on the basis of their ability to profit from instruction on the Kohs blocks. Success and failure on verbal and nonverbal tasks were manipulated and levels of aspiration were obtained. Nongainers were found to be less realistic than gainers in goal-setting. The disruptive effect of failure on goal-setting was greater for nongainers, and temporal patterns of success and failure had a much greater impact on the goal-setting behavior of nongainers. Assuming that the differences between the two groups would hold after adjustment for IQ differences, the results were in accord with previous findings that performance-discrepant goal setting is more characteristic of children with a long history of failure than those without one. (RJ)

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STUDIES IN LEARNING POTENTIAL

LEVEL OF ASPIRATION AS A FUNCTION OF LEARNING POTENTIAL STATUS IN THE EDUCABLE MENTALLY RETARDED

By

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SUMMARY AND ABSTRACT

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Two groups of educable mental retardates (gainers and non-gainers) were identified on the basis of their differential ability to profit from instruction on the Kohs Blocks. Their levels of aspiration were obtained for performances on verbal and nonverbal tasks following experimentally manipulated success and failure. Performance discrepant levels of aspiration (PDLA) were found to be more typical of nongainers than gainers, especially after failure. Compared with the gainers, the nongainers' PDLA was more affected by nonverbal than verbal tasks, and by the specific sequences of success and failure used in the experiment. The results are consistent with previous findings relating PDLA to a history of failure and with an anchoring theory which suggests that the gainers' more realistic goal setting is dependent on wide experience of both success and failure.

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Budoff and his associates have reported considerable heterogeneity of ability to reason and learn when a learning potential strategy of assessment is employed in contrast to the usual individual intelligence test criterion with educable mentally retarded (EMR) students. The learning potential assessment employs nonverbal reasoning problems (Kohs Blocks) in a paradigm that permits the child the opportunity to become familiar with the tasks by means of an individual instructional session, couched in a context of positive support and aimed at building a sense of competence (See Budoff & Friedman, 1964, for details of the procedure). Three patterns of response to this type of assessment are evident within the narrow EMR IQ range (60-80 IQ). Some Ss (high scorers) demonstrate excellent understanding on the trial prior to training, figuring out the problems as they proceed from easy to harder instances, and perform at levels typical of higher IQ children. Other Ss (gainers) perform poorly on the pretest administration, but do improve their scores markedly following instruction. The third group of Ss (nongainers) perform poorly initially and do not profit from the instructional procedure.

A variety of data have demonstrated that the increased ability evident among high scorers and gainers is not specific to the particular reasoning problems (See Budoff, 1968, 1969; Budoff & Pagell, 1968). The educational utility of this difference in ability to learn and profit from experience (i.e., intelligence) was tested in two groups of those children: psychometrically classified as EMRs; and regular class children from similar , economically poor backgrounds. A laboratory science course in electricity was given to both groups and was evaluated nonverbally. High able children by the learning potential criterion (high scorers and gainers) learned more than low able children by this criterion (nongainers), and the latter essentially learned very little after approximately 25 hours of classroom instruction. Further, learning potential status accounted for more of the individual differences in amount learned than children's membership in special versus regular class (Budoff & Meskin, 1969).

These studies have generated the hypothesis of real and persisting differences in ability to profit from experience among students whose IQ scores place them in the EMR range when they are assessed by a learning potential strategy. More specifically, that high able learning potential EMRs (high scorers and gainers) may be educationally handicapped, while low able EMRs (nongainers) appear to function as mentally retarded students. Additional data, still unpublished, indicates different patterns of motivational responses among these three groups.

As part of this continuing program of research, a level of aspiration study was designed to determine whether there were differences between gainers and nongainers in the degree to which their

aspirations continued to be realistic following experimentally manipulated success and failure experiences[3]. Several studies suggest that failure leads to unrealistic goal setting. Jucknat (1937) and Sears (1940) demonstrated that average IQ children with a long history of failure tend to set goals which are discrepant (either too high or too low) with their immediately preceding performances when compared with children with a less severe history of failure. Ringelheim (1958) compared retardates with normals in their degree of confidence in reaching a pre-set goal following experimentally manipulated success and failure. There was no difference between the groups on this variable. He did find that failure, preceded by success, lowered the confidence level of retardates more than that of normals. He also found that the correlation between performance on the previous trial and confidence of success on the next trial was affected by the experimental conditions. Under failure conditions, the correlation between the two measures was minimal. Under success conditions the two variables were closely correlated.

Experiences of success and failure appear also to have differential effects on motor performance of retardates and normals. Gardner (1957), using a card sorting task, reported that retardates performed best under a success condition, at intermediate latencies under failure, and no reinforcement conditions, and worst under failure after initial success. Using a reaction time task, Heber (1957) reported that retardates responded more rapidly in a success condition, and less rapidly during failure than normal Ss. Gardner (1957), manipulating failure on a pencil marking task, indicated that retardates' efficiency of performance on a card sorting task was most adversely affected by failure. That is, normal Ss

tended to work harder following a period of failure than EMRs.

In the present study, nongainers were assumed to have had a more consistent history of failure than gainers, suggesting the following hypotheses:

1. Nongainers will set performance goals for themselves less in accord with their actual past performance than will gainers;

2. Both groups will set more performance-discrepant goals after experimentally induced failure than after experimentally induced success;

3. The effect of experimentally induced failure should lead to more performance-discrepant goal setting in nongainers than in gainers.

Two types of tasks--one explicitly verbal, the second nonverbal but symbolic--were used in this experiment. It was assumed that gainers and nongainers (both having been relegated to special class) would have roughly comparable experiences of failure in the verbal area. However, the nongainers should have experienced more failure in nonschool, nonverbal areas than should gainers. It was further predicted, therefore, that:

4. Performance-discrepant goal setting should be more characteristic of nongainers than gainers on the nonverbal tasks; but there would be no differences between gainers and nongainers in performance-discrepant goal setting on the verbal tasks.

Method

A. Subjects

The sample consisted of thirty-two subjects drawn from special classes in three public schools located in economically poor

neighborhoods. Sixteen gainers and nongainers were chosen; the groups were subdivided equally by sex. The mean IQ for gainers was 72.0 (range 61-84) and for nongainers 67.5 (range 53-78). CA of gainers was 14.4 and of nongainers was 14.3, with a range of 13-16.5 and 12.5-16.3 for the two groups, respectively; t-tests indicated no difference between the groups for CA, but a near-significant difference in IQ ($p < .07$). Ss from each learning potential status group by sex were assigned at random to one of the eight possible orders and to one of the two experimenters.[4]

B. Experimental Tasks and Conditions

The verbal task consisted of scrambled words. Ss were asked how many words they thought they would be able to unscramble in a given period of time. Two, three, and four letter words were used. The words were pretested on pilot samples to determine difficulty level of the words and/or orders, and how many two, three, and four letter words the Ss could unscramble in a minute. From the results of this pretesting, eight series of different degrees of difficulty were constructed by using different proportions of two, three, and four letter words so that each series, unequal in length, would take about 75 seconds to complete. During pretesting these series were found to take approximately equal time. Each scrambled word was printed on a card, and the total of 125 scrambled words were put on a ring.

The nonverbal task was a symbol to symbol sorting task. This particular task was selected because it seemingly required conceptual ability and was thus a nonverbal counterpart to the scrambled word task. A card was drawn with seven symbols in the top row (a star, a square, etc.) as the key and seven different figures on the bottom row. A bag containing small cut-out figures

corresponding to those on the bottom row was given to the S, who was required to put those figures into boxes marked with the same figures as the top row on the key. Pretesting revealed the task to be relatively easy for the subjects and various modifications were made including making some of the figures odd shapes, making some very similar to those on the key (a circle and an octagon), having figures of the same shape but of either red or blue to be matched according to both shape and color, and having a miscellaneous box in which figures were to be put which did not correspond to any on the top key. These modifications served to make the task more difficult and interesting. Subjects were asked how many figures they thought they would be able to sort in a given period of time. The level of aspiration measure on both tasks was how many the subject thought he could do in a fixed time period.

C. Manipulation of Success and Failure

Success and failure was manipulated by pre-arranging difficulty levels of the stimuli so that a different number of problems could be solved correctly within a given time period. In the success condition, the number of problems S was permitted to solve correctly increased on each of four trials according to a pre-arranged schedule, and were decreased successively in the failure condition. Reaction of pilot Ss led the E to believe that the improvement or decline in their actual performance was more important in their subjective feeling of success and failure than any of the comparisons they made between level of aspiration and performance. To maximize the success and failure experience, Ss were reminded after each trial as to how their performance on the trial compared with preceding trials (i.e., whether it was increasing or decreasing).

The actual number correct for each trial of a task was fixed according to a prearranged schedule. In this way, the actual performance levels were the same for all Ss for any given trial within a condition. Consequently, the inter-individual level of aspiration discrepancy scores could be readily compared. Had the performance levels not been controlled, they would have been a function of the S's ability, and one could not have assumed that discrepancies equal in absolute value were subjectively identical at different performance levels. The actual numbers chosen for the performance levels were selected to give step-wise increments or decrements in score and to allow a roughly similar amount of time to be spent on each trial. The level of performance by trials was set at: Verbal Success: 8, 12, 16, 20; Verbal Failure: 20, 16, 12 8; Nonverbal Success: 12, 24, 32, 40; Nonverbal Failure: 40, 32, 24, 16. It was not possible to set the scores equal for corresponding trials of the verbal and performance tasks as pre-testing had shown the sorting task to be considerably easier than the anagram task. By arranging the levels of performance as above, the tasks were equalized (empirically) with respect to the amount of time necessary for corresponding trials across tasks.

D. Experimental Design

Each S received the same experimental treatment . The order of administration of the experimental conditions was counterbalanced with respect to verbal and nonverbal tasks, and within these for success and failure. Each of the resulting eight orders[5] (VSF-NVSF; VSF-NVFS; VFS-NVSF, VFS-NVFS; NVSF-VSF; NVSF-VFS; NVFS-VSF; NVFS-VFS) was given to two gainers and two nongainers, one of whom

was a boy and the other a girl in each learning potential status group, who were randomly assigned to each order. For each of the experimental manipulations (verbal success, verbal failure, nonverbal success, nonverbal failure) four trials were given. Thus, each S was required to make sixteen level of aspiration decisions. It was felt that four judgments of each condition was not too tiring and would give a more stable reflection of the level of aspiration than would a single judgment.

E. Procedure

Subjects were tested individually. The S was seated at a table opposite E and was told that he would be given two tasks to do, a "sorting task and a task involving scrambled words", and was encouraged to do his best. Then, depending on the order assigned to that S, the verbal or nonverbal task was explained in more detail. For the verbal task, the S was told:

> We are going to play a game with scrambled words. Do you know what a 'scrambled' word is? Let me show you. On this card are the letters U - C - T. If you put them together in the right order they will make a word, but as they are now they do not make a word. On this card these same letters are arranged correctly--C - U - T is cut. Now here is a card with another scrambled word, the letters U - B - S. Can you tell me what it would make when put together correctly? (Two additional words, milk and my, were similarly demonstrated).

For the nonverbal task the S was told:

This is a sorting game. On this card there are two rows of different shapes. On this top line they are all yellow. Each of these boxes has a matching yellow shape. Here's a star and here's a star; here's an 8-sided figure--here's the same.

Below the yellow shapes, there are red and blue ones--the same kind that are in this bag. I'd like you to pick a figure out of the bag and put it into the right box. You do it like this: pick out one figure. Here's a blue square, so you look on this line for a blue square. It's here and it's below the yellow star. So you put the blue square into the box with the yellow star. Here's a red circle. Now, you look for a red circle and find that it's below the cross. So you put the red circle into the box with this cross. This time I've picked a blue circle. Is there any blue circle in this line? No, there isn't. There's a red circle but not a blue one. At the end, there's a box for any shapes which do not exactly match the shapes on this card. So you put the blue circle into that box. Now you try some.

He was then asked to guess how many he thought he could do in the 75 seconds. This "blind" aspiration trial was not counted in the results but served to orient S with respect to the task. After

the trial S was told how many he had done (he was allowed to complete only the scheduled number, the time being manipulated for that purpose) and asked to state how many he thought he would be able to do next time. When the eight trials had been completed, E suggested a change and the other task was explained. During the success series of each task, S was encouraged with occasional remarks of "good"; no comments were made during the failure series. Ss who ended in failure on their last task were given extra trials at the end so that they finished with success. Ss were asked how they felt they had done, and were told that they had indeed done very nicely.

Although no formal instruments were used to measure Ss' subjective reactions to success and failure, their overt reactions during the experiment left little doubt as to their effectiveness. During the failure condition many Ss were close to tears, and during the success condition they were considerably more relaxed.

Results

Each S had 16 unsigned discrepancy scores (between his current level of aspiration and his just-previous level of performance), four for each condition. These were summed for each of the four conditions, and these summed scores were entered in a six way analysis of variance: learning potential (LP) (2) x sex (2) x success-failure pattern (SFP) (4) x task (verbal vs. nonverbal) (2) x success-failure (SF) (2) x order (1st task vs. 2nd task) (2). Since there was only one subject in each cell, replicates were not available for a treatment x subjects error term, and estimated

mean square error terms were derived from the highest order interactions and used to test the simpler effects.

Table 1 summarizes the results of the six way analysis of variance. The first hypothesis which states that nongainers will set more performance-discrepant goals than gainers was supported (LP main effect, $\underline{F}$ = 13.45, $\underline{df}$ = 1/10, $\underline{p} < .01$). The gainers and nongainers had mean discrepancy scores of 18.66 and 27.47[6], respectively. The second hypothesis which predicts that failure will lead to more performance-discrepant goal setting than success was supported ($\underline{F}$ = 3.24, $\underline{df}$ = 1/48, $\underline{p} < .05$, one-tailed test). The mean goal discrepancy score after failure was 24.69; after success, 21.44. The third hypothesis predicts that failure will have a differential effect on gainers and nongainers such that non-gainers will respond to failure with more performance-discrepant goal setting than gainers. The $\underline{F}$-ratio for the learning potential x success-failure interaction is 7.12, $\underline{df}$ = 1/48, $\underline{p} < .01$. The nongainers' reaction to failure contributes most of the variance, as the means indicate (NG, F = 31.50; G, F 17.88; NG, S 23.44; G, S = 19.44).

Insert Table 1 about here

The fourth hypothesis, predicting an interaction between LP status and type of task, was only marginally supported(F= 2.71, $\underline{df}$ = 1/48, $\underline{p} < .10$, one-tailed test). The differences between gainers and nongainers were most pronounced on the nonverbal task, and less so for the verbal task. The four relevant means: G, NV = 22.66; NG, NV = 34.44; G, V = 14.66; NG, V = 20.50. A refinement of this hypothesis

leads to the prediction that it should only apply after failure, not after success, since the performance-discrepant goal setting should be more or less equal across tasks and LP groups for the success condition. In the failure condition, the effects predicted by the hypothesis should be more apparent. This prediction was not supported (LP x task x SF interaction, $F < 1.0$).

Other Significant Results

The fact that the verbal task led to less discrepant goal setting than the nonverbal task ($F = 36.98$, $p < .001$) was expected on the basis of the different scale in number of successes permitted on the two tasks.

Most of the other significant interactions reflect the effects of the temporal sequence of success and failure (SFP) on the various groups. While neither the main effect of success-failure pattern (SFP) nor its interaction with LP status was significant, the interaction of SFP with sex, and sex x LP was significant ($F = 6.37$, $p < .01$; $F = 5.23$, $p < .05$, respectively).

The success-failure-success-failure pattern, which resulted in larger discrepancies than the other patterns, had its greatest impact among the girls; the failure-success-failure-success pattern led to more performance-discrepant goal setting among the boys. The interaction between SFP, sex and LP status shows that it is the non-gainer group which contributes most of the variance to the simpler SFP x sex interaction. The goal-setting behavior of the nongainer group is more affected by the sequence of success and failure (although different sequences are particularly relevant for each sex) than is the goal-setting behavior of the gainer group.

The significant interaction between success-failure pattern and order (F = 7.02, $p < .01$) and this interaction with LP status (F = 6.96, $p < .01$) tell a similar story. For the two factor interaction, regardless of the pattern of success and failure in the first half of the experimental procedure, subjects who had success, then failure in the second half of the experiment, had higher discrepancy scores than those who experienced failure, then success in the second half of the experiment. The more complex interaction indicates that the nongainers contribute most of the variance to the simpler interaction effect. Again, nongainers are most sensitive to the variations in experimental conditions, particularly those experienced during the last half of the experiment.

The one remaining close to significant interaction is that between learning potential status and the type of task administered first. (LP x verbal-nonverbal x order, F = 4.72, df = 1/10, $p <$ .06). Gainers are about equally discrepant in their goal-setting behavior regardless of whether they were assigned to a group in which the nonverbal task was administered first, then verbal, or to the group in which the verbal task was administered first, then the nonverbal. Nongainers given the nonverbal task first and then the verbal had the highest discrepancy scores. If one equates "nonverbal" with "success", "verbal" with "failure", on the assumption that verbal materials are more difficult for these children, this interaction repeats that found for success-failure sequences in the second part of the experiment (LP x SFP x order): nongainers appear to be particularly vulnerable to the sequence of success first, then failure.

Discussion

The three main findings of the study appear to be as follows:

1. Ss who can be taught to do reasonably well on the Kohs blocks after training in principles appropriate to solution (gainers), are more realistic in their goal-setting behavior than those subjects whose performance on the Kohs blocks does not improve after teaching (nongainers);

2. The disruptive effect of failure on realistic goal-setting is greater for nongainers than gainers; and

3. Temporal patterns of success and failure have a much greater impact on the goal-setting behavior of nongainers than on that of gainers.

The first finding, that nongainers are less realistic than gainers in their goal-setting, may be a function of IQ rather than of performance on the Kohs task. To check this possibility, a covariance procedure could normally be run. In this instance, however, the absence of replicates within cells makes this procedure inadvisable. Using a correlational framework, alternatively, the point biserial correlation between LP status and performance-discrepant goal setting (ignoring IQ) is -.41; whereas the correlation between IQ and performance-discrepant goal setting is +.023. This result indicates that the correlation between LP status and performance-discrepant goal setting is not attributable to the correlation (+.31 in this sample) between LP status and IQ.

Assuming that the difference between gainers and nongainers would hold after adjustment for IQ differences, the present results

are in accord with a position stated by Sears (1940) that performance-discrepant goal setting is more characteristic of children with a long history of failure than those without one. We assume nongainers have experienced failure more consistently than gainers, and the findings of this study appear to support the assumption and Sears' findings with nonretarded children. These results within the EMR population are in accord with results cited earlier (e.g., Gardner, 1957 and Ringelheim, 1958) indicating that failure was most disorganizing to EMRs when it followed success, but not similarly disorganizing to nonretarded children. The responses of the gainer EMRs was similar to that of normals of these earlier studies, while the nongainers' performance conforms to the pattern for EMRs.

The other major findings of the study expand further the relevance of the distinctions among EMRs derived by means of the learning potential procedure, since this difference is apparent on a noncognitive motivational task. Success, failure, and their temporal patterning have much more impact on the nongainer than on the gainer. It may be that the gainer's greater history of success in some areas, e.g., with nonverbal materials, compared with the nongainers', allows the gainer to cope with the mild failure more successfully than the nongainer. Because the gainer has experienced both success and failure, he may be more aware of his strengths and weaknesses, and hence, more able to adjust his own expectancies to the demands of a particular situation. In this situation, his aspirations tended to track his manipulated performance. By contrast, the nongainer, having experienced failure more consistently, may be less able to evaluate his ability realistically, especially in the wake of the heady experience of success. When faced with another prospective

failure, he tends to deny it. When faced with a succession of "failures", i.e., not meeting his aspired level, he continues to aspire unrealistically and fails to adjust it to his actual performance. Whether the consistent pattern of failure experienced by the nongainer is a self-fulfilling, self-perpetuating prophecy (failure leads to performance-discrepant goal setting which in turn leads to more failure) or whether it is a function of lower innate ability is quite unresolved.

Footnotes

1. The research described was made possible by support of grants 10588 from the National Institute of Mental Health and 8-0506 from the Division of Research, Bureau of the Handicapped, Office of Education, U. S. Department of Health, Education and Welfare.

2. 12 Maple Avenue, Cambridge, Massachusetts, 02139.

3. The study as described below manipulated success and failure by a pre-set performance level. High scorers were not included in the study because they saw through the manipulation very early in the experimental procedure.

4. Thanks are due to Mrs. Ann Roberts, who, along with Judy Singer, served as an E and helped formulate the problem.

5. Verbal-Success, Failure (VSF)--Nonverbal-Success,Failure (NVSF); Verbal-Success, Failure (VSF)--Nonverbal-Failure, Success (NVFS); Verbal-Failure, Success (VFS)--Nonverbal-Success, Failure (NVSF); Verbal-Failure, Success (VFS)--Nonverbal-Failure, Success (NVFS); Nonverbal-Success, Failure (NVSF)--Verbal-Success, Failure (VSF); Nonverbal-Success, Failure (NVSF)--Verbal-Failure, Success (VFS); Nonverbal-Failure, Success (NVFS)--Verbal-Success, Failure (VSF); Nonverbal-Failure, Success (NVFS)--Verbal-Failure, Success (VFS).

6. Each of these means is based on the total (for a block of four trials) number of discrepancies between aspiration and just previous performance for an experimental condition. To obtain the mean discrepancy per estimate, the reader should divide the reported means by four.

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Table 1
Analysis of Variance of Discrepancy Scores

Between Subjects (31 df)

Source	df	F	Source	df	F
LP Status (LP)	1	13.45**	LP x SFP	3	2.33
Sex	1	.31	Sex x V-NV-S	1	.10
Sequence: NV then V vs V then NV(NV-VS)	1	2.40	Sex x SFP	3	6.37*
			V-NV-S x SFP	3	1.30
Success-Failure Pattern (SFP)	3	2.17	LP x Sex x SFP	3	5.23*
LP x Sex	1	1.94			
			Remainder	10[a]	184.71
LP x V-NV-S	1	4.72			

Within Subjects (96 df)

Order:(1st half versus 2nd)	1	.35	V-NV x LP x Sex x SFP	3	1.37
O x LP	1	1.39	Success vs Failure (SF)	1	3.24
O x Sex	1	.98	SF x LP	1	7.12*
O x SFP	3	7.02**	SF x Sex	1	2.38
O x LP x Sex	1	.03	SF x SFP	3	.75
O x LP x SFP	3	6.96**	SF x LP x Sex	1	.01
O x Sex x SFP	3	.64	SF x LP x SFP	3]	.99
O x LP x Sex x SFP	3	1.75	SF x Sex x SFP	3	1.86
Verbal vs Non-verbal (V-NV)	1	36.98**	SF x LP x Sex x SFP	3	2.80*
V-NV x LP	1	2.71			
V-NV x Sex	1	.94	All interactions SF x Order with LP, Sex, & SFP	16	123.53
V-NV x SFP	3	1.17	All interactions SF x V-NV with LP, Sex,& SFP	16	54.43
V-NV x LP x Sex	1	.58			
V-NV x LP x SFP	3	3.10*	All interactions SF x V-NV x Order with LP, Sex, and SFP	16	134.37
V-NV x Sex x SFP	3	1.84			
			Pooled Interactions[b]	48	104.11

* < .05; ** < .01; a-error term used for all between-subjects F-ratios. b-error term used for all within-subjects F ratios.